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intellect strike one as being predominantly abstract, — a result, doubtless, of their long life in cities, and exclusion from nature on the one side, and from the education which lies in handicrafts on the other. We may expect great mathematicians and philosophers from them, but not great inventors, biologists, or painters, till they have had time to throw off the effects of their long seclusion from nature.

RECENT CHALLENGER REPORTS.

Report on the Schizopoda (vol. xiii.). By Prof. G. O. SARS. London, Government, 1885. 4°.

THE Schizopoda and Cumacea collected during the voyage of the Challenger were placed in the hands of Professor Sars of Christiania for examination and description, and very wisely, for he had done more to elucidate these groups than all other authors combined. This report, by far the most important addition yet made to our knowledge of the Schizopoda, more than justifies the English authorities in intrusting certain portions of the Challenger collections to foreign naturalists. Fifty-seven species of Schizopoda, representing twenty-one genera, are here fully described and very carefully and elaborately figured by the author himself, who says very truly that the collection "has turned out extremely rich, and of very special interest;" but this result is undoubtedly very largely due to the great care with which Professor Sars has examined the miscellaneous material collected in surface-nets, and submitted to him. Forty-six of the fifty-seven species were first made known by the Challenger expedition, and the elaborate working-out of this large number of new forms from widely different regions and depths affords most important new material for discussing the proper subdivision of the Schizopoda and their relation to the other Crustacea.

Professor Sars, I am glad to see, regards the Schizopoda as a suborder distinct from but closely allied to the Decapoda proper, and retains with them the Euphausiidae, in spite of Dr. Boas' arguments that they should be regarded as a distinct order. He also shows that the genus Eucopia, which has been referred to the Penaeidea by Dana and Bate, is a true schizopod, though representing a distinct family. Thus we have four families of Schizopoda: Lophogastridae, Eucopiidae, Euphausiidae, and Mysidae.

The Lophogastridae, which, previous to the Challenger expedition, was represented by a single genus, is here augmented by the remarkable genus Gnathophausia and two new genera. Of Gnathophausia, which was first made known by Willemoes-Suhm during the progress of the ex-

pedition, and contains the largest known schizopods, no less than nine species are here described, one of them over six inches in length. The anatomy of the genus is carefully worked out, and its affinities to Lophogaster well shown. All the species of the family appear to be inhabitants of deep water.

The account of the Euphausiidae is the most important and interesting part of the work. Nearly all the species of this family are pelagic in habits; and Professor Sars' careful examination of the surface collections made on the expedition has not only added largely to the number of species made known, but has enabled him to bring together and describe many of the post-embryonal stages of several of the forms. Twenty-eight species representing eight genera of the family are described, and twenty-three of the species and four of the genera are new. The entire anatomy of several species is worked out, and the articular appendages of nearly all of them are figured in detail. Under the genus Euphausia, the peculiar eye-like organs situated on or between the bases of the legs are very carefully described, and apparently well shown to be luminous, and not visual organs. Although many of the species of the family are often taken in the greatest abundance, egg-bearing females are only very rarely seen; and, until very recently, nothing was positively known in regard to the manner of carrying the eggs, a single long-ago-recorded observation of Bell being somewhat doubtful. Professor Sars, however, has now found species of several different genera, carrying masses of eggs beneath the body in the same position as in other Schizopoda, though not enclosed in a pouch formed of lamelliform appendages, thus confirming Bell's observations and those of the present writer, published in 1884.

In the chapter on the development of the Euphausiidae, post-embryonal stages of species of Nyctiphantes, Euphausia, Thysanopoda, and Nematocarcinus, are carefully made out, and fully described and figured; and this is all accomplished with what is usually regarded as the refuse from the surface-collecting net. These investigations fully confirm the observations of Claus, Sars himself, Metschnikoff, and the present writer, and show that the typical Euphausiidae are hatched, like barnacles and copepods, as true nauplii, with unsegmented body, no compound eyes, and only three pairs of appendages, and that they pass through a long series of intermediate stages to the adult condition. Sars regards this naupliar development as characteristic of all the Euphausiidae, which seems somewhat doubtful when we consider the small number and

enormous size of the eggs of one of the species of *Stylocheiron* here described.

The Mysidae were far better known than the other Schizopoda, and the account of the Challenger species is consequently less important than that of the other families; still sixteen species belonging to nine genera are described. A short appendix contains descriptions of four ecto- and two endo-parasites of species described in the report.

The fact that the work was written in a language foreign to the author is scarcely noticeable, and errors are rare. A few mistakes have resulted from changes and additions during the progress of the work, as the failure to change the generic name of *Amblyops australis* on p. 12, and the incorrect statement of the number of genera and species on pp. 63 and 172.

The numerous excellent plates bear the impress of a Stockholm lithographer, and add to the international character of the work.

S. I. SMITH.

Lamellibranchiata (vol. xiii.). By EDGAR A. SMITH. London, Government, 1885. 4°.

THE report on the bivalve mollusks consists almost exclusively of a list of the various species comprised in the collection, with such remarks as appeared to be of interest, and of the descriptions and figures of the species new to science. The anatomical work on those species of which the soft parts were preserved has been placed in other hands, and is not yet published. The Rev. R. Boog Watson retains the gastropods and solenocochs, but, after doing certain preliminary work, concluded to relinquish the present group, which was very appropriately placed in the hands of Mr. Smith, well known to all students of the invertebrates as the courteous and hard-working assistant in charge of the Mollusca of the British museum.

The Challenger collection of lamellibranchs was obtained from the dredgings at some hundred and fifteen stations, and comprises about five hundred species, of which four hundred and fifteen were found in water less than two hundred fathoms deep, nine in water over two thousand fathoms deep, and the remainder at intermediate depths. The greater part of the collection, therefore, is not of an abyssal character, and, in fact, forms an important contribution to the fauna of the Southern Ocean, and especially Australian waters; but the portion relating to the deep-sea forms is, of course, the most interesting and biologically most important, and will prove indispensable to all students of that branch of biology. The plates are excellent,

and the proof-reading good, though we notice the references to plate vii., in the text, all read plate viii. A few species which came in at the last moment are represented by woodcuts in the text.

The collection shows that no special student of the Mollusca accompanied the expedition; for the opportunities were so great, that a qualified collector would certainly have done much better, both as to the number of species collected and in regard to their biography. It must be remembered that the Challenger party worked with much less perfect instruments and methods than are at present available, and that the loss of time incurred by the use of rope in dredging is doubtless accountable for the washing-out of many valuable specimens which actually got into their dredges. Mr. Smith is quite conservative in his estimation of what constitutes a genus, but we are inclined to agree in his decision that only one new generic group is represented in the collection. This is called *Silenia*, and is distinguished from *Lyonsiella* by both anatomical and conchological characters. It was found in the deep water of the South Atlantic. The general considerations of the report are brief. The remarkable sporadic appearance of several forms in widely separated localities (Red Sea and Fiji Islands, Canaries and North Pacific, Australia and West Indies, and the like) is instructively commented upon, though perhaps none of the cases are more remarkable than the recent discovery of *Pecten pleuronectes* by the U. S. fish commission in the West Indies. The wide bathymetrical distribution of certain species, shown for the West Indies in the preliminary notes on the Blake mollusks, is fully confirmed for other regions by the Challenger collection; e.g., *Lima multicostata* in two thousand and in one thousand and seventy-five fathoms. *Neaera*, *Arca*, and *Amussium* were among the most frequent and most characteristic forms of the deeper water. *Callocardia* appeared in very deep water, in about the same latitude, in both the Atlantic and Pacific. On the whole, Mr. Smith concludes that the lamellibranchiate fauna of the deeps possesses no special or extraordinary character. The species are fewer than in shallower water, and new or peculiar forms are still more exceptional. No special modification of color, epidermis, or weight, seems to be correlated with existence in the benthal zone; for most of the species found there belong to genera whose representatives are thin and pale, whether they are found in deep or shallow water. A tabular exhibit of the distribution in depth and area, of the deep-water species, would have been a valuable addition to the report, which has an excellent index to the text and plates.